(12) PATENT APPLICATION
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. **AU 198431843 A1**
(10) Patent No. **577538**

(54) Title
OPTICAL SMOKE DETECTORS

(51) International Patent Classification(s)
G08B 017/10

(21) Application No: **198431843** (22) Date of Filing: **1984.08.10**

(30) Priority Data

(31) Number	(32) Date	(33) Country
PG0822	**1983.08.12**	**AU**

(43) Publication Journal Date: **1985.02.14**
(44) Accepted Journal Date: **1988.09.29**

(71) Applicant(s)
Vision Systems Limited

(54) Inventor(s)
Martin Terence Cole

31843/84 Form 1.

COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1969

577538

APPLICATION FOR A PATENT

COMPLETE AFTER PROVISIONAL SPECIFICATION No. 31843/84

(1) Here insert (in full) Name or Names of Applicant or Applicants, followed by Address (es).

I/~~We~~ (1) MARTIN TERENCE COLE

of 7 Loxwood Avenue, Keysborough,

Victoria, Australia, 3173

(2) Here insert Title of Invention.

hereby apply for the grant of a Patent for an invention entitled (2)

"OPTICAL SMOKE DETECTORS"

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 12-8-88

which is described in the accompanying PROVISIONAL ~~COMPLETE~~ specification.

~~My~~/Our address for service is Messrs. Edwd. Waters & Sons, Patent Attorneys, 50 Queen Street, Melbourne, Victoria, Australia.

LODGED AT SUB-OFFICE
12 AUG 1983
Melbourne

DATED this 11th day of August 1983

MARTIN TERENCE COLE

By my Patent Attorneys
EDWD. WATERS & SONS

(3) Signature (s) of Applicant (s) or Seal of Company and Signatures of its Officers as prescribed by its Articles of Association.

(3)

By: L.J. Dyson
Registered Patent Attorney

To:

THE COMMISSIONER OF PATENTS.

Edwd. Waters & Sons, Melbourne.

COMMONWEALTH of AUSTRALIA

Patents Act 1952-1969

31843/84

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT OR PATENT OF ADDITION

(1) Here insert (in full) Name of Applicant or Applicants.

In support of the Application made by[1]
MARTIN TERENCE COLE

(2) Here insert title of Invention.

for a Patent for an invention entitled:[2]
"OPTICAL SMOKE DETECTORS"

I/~~We~~[1] MARTIN TERENCE COLE

(3) Here insert (in full) Address or Addresses.

of[3] 7 Loxwood Avenue, Keysborough, Victoria, Australia, 3173

20- PAID
NO. 56004

do solemnly and sincerely declare as follows:

1. I am/~~We are~~ the applicant for the patent.
2. I am/~~We are~~ the actual inventor of the invention.

NTS TRADE MARK & DESIGNS OFFICE

~~or~~

(4) Here insert full Name(s) and Address(es) of Actual Inventor(s) if other than Applicant.

~~the actual inventor of the invention, and the facts upon which I am/We are entitled to make the application, are as follow:~~

(5) Full Name of Actual Inventor or Inventors.

~~I am/We are the assignee of the said~~[5]

DECLARED at Keysborough

this Eleventh day of August 19 83

(6)

(6) Signature of Applicant or Applicants.

To:

THE COMMISSIONER OF PATENTS.

Edwd. Waters & Sons
Melbourne

(12) PATENT ABRIDGMENT (11) Document No. AU-B-31843/84
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 577538

(54) Title
OPTICAL SMOKE DETECTORS

(51)4 International Patent Classification
G08B 017/10

(21) Application No. : 31843/84 (22) Application Date : 12.08.83

(23) Filing Date of Complete Specification : 10.08.84

(43) Publication Date : 14.02.85

(44) Publication Date of Accepted Application : 29.09.88

(60) Related to Provisional(s) : PG0822

(71) Applicant
MARTIN TERENCE COLE

(72) Inventor
MARTIN TERENCE COLE

(74) Attorney or Agent
EDWD. WATERS & SONS

(56) Prior Art Documents
US 4089047

(57) Claim

1. Pollution detecting apparatus comprising

a) means forming a sampling chamber;

b) inlet and outlet ports spaced from one another for flowing through said sampling chamber a gas to be sampled;

c) a window in said sampling chamber between said ports;

d) a light source having an elongate component outside said sampling chamber and adjacent said window for admitting into said sampling chamber a first portion of light emitted from said source;

e) reflector means; and

f) means supporting said reflector means adjacent said source for reflecting into said sampling chamber a further portion of light emitted from said source;

g) said reflector means including an elongate component adjacent the corresponding component of said source and being configured to reflect into said sampling chamber substantially all light emitted by said source than said first portion.

577538

Form 10

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-69

COMPLETE SPECIFICATION

(ORIGINAL)

Class Int. Class

Application Number: PG 0822/83
Lodged: 12th August 1983

Complete Specification Lodged:
Accepted: 31843184
Published:

Priority :

Related Art :

Name of Applicant : MARTIN TERENCE COLE

Address of Applicant : 7 Loxwood Avenue, Keysborough, Victoria, Australia

Actual Inventor: MARTIN TERENCE COLE

Address for Service : EDWD. WATERS & SONS,
50 QUEEN STREET, MELBOURNE, AUSTRALIA, 3000.

Complete Specification for the invention entitled:

OPTICAL SMOKE DETECTORS

The following statement is a full description of this invention, including the best method of performing it known to : me

This invention relates to a light source for use in an optical smoke detector of extremely high sensitivity. In particular, a smoke detector as disclosed in my Australian Patent Application No. PG 0820/83 a cross reference to which is incorporated therein, may utilise the light source herein.

The present invention is particularly adapted for use with an axial-light absorber as described in my co-pending Australian application No. PG0821/83 and a sampling chamber disclosed in my co-pending Australian Application No. PG0820/83 both filed 12th August 1983.

The sampling chamber is particularly suited for use with the sampling device or point disclosed in my co-pending Australian Application No. PG0116/83 filed 4th July 1983.

Cross-reference is also made to my co-pending Australian Application No. PG1975/83 filed on 21st October, 1983, disclosing optical air pollution monitoring apparatus and No. PG4919/84 filed on 9th May 1984, disclosing an improved solid state anemometers and temperature, all of which are hereby incorporated herein as part of the disclosure.

With optical smoke detectors it is necessary to provide a light source of low capacity to irradiate any smoke particles that are drawn into the sampling chamber.

Reduction in energy input lengthens the operational life of the light tube and serves to decrease current drain from a standby battery required to maintain operation in the event of mains failure. Reduction in current drain either increases the life of the battery or reduces the capacity requirement and therefore the cost of the standby battery.

The present invention has for its principal objective the provision of a focusing reflector for a Xenon flash tube, optionally of substantially U-shape configuration, wherein the reflector is configured to match

the shape of the Xenon discharge arc, the reflector adapted to be positioned on the side of an air sampling chamber between an ambient air inlet and outlet, the light emission from the arc being focused into the central region of the sampling chamber.

Conveniently, the light is transmitted through an open window in the sampling chamber the perimeter of the reflector body being sealingly attached to the outer surface of the chamber surrounding the window opening to enable circulation of atmosphere within the reflector body when in operation.

The invention will be described in greater detail having reference to the accompanying drawings in which:

Figure 1 is a section view of a sampling chamber showing various components including a light reflector.

Figures 2 and 4 show detailed sectional views of the reflector construction.

Figure 3 is a sectional view on line A-A of Figure 4 and Figure 5 is a sectional view in line C-C of Figure 4.

The reflector body 60 includes a concave U-shaped reflector element 61 designed to focus light inpinging thereon from each infinitesimal cross-sectional element of a U-shaped Xenon flash tube into a central region 72 of air sampling chamber 70. The body 60 is attached to a flat surface of the chamber 70 by sealing flanges 60a and 60b. The flat surface 71 of chamber 70 enables simplified sealing and allows the use of an open window 74 for transmission of light into the chamber. The open window allows for circulation of air around the flash tube 62 thereby preventing the build up of potentially damaging ozone in the device.

Alternatively, the light window 74 may be sealed by clear glass or plastic (not shown) to seal the reflector chamber, whereby the reflector chamber 60 can be filled with an inert gas such as nitrogen. Further, alternatively, a flash tube of quartz glass which prevents the formation

of potentially corrosive ozone, can be used. However, the use of an inert gas is costly whereas the latter alternative prevents detection of scattered ultra violet light, thereby altering the calibration of the sampling tube in respect of certain products of combustion.

The reflector 60 is provided with a mounting base 63 which is preferably in the form of a printed circuit board serving as a mounting for the electrode leads of the flash tube 62. Sealing of the circuit board base 63 to the reflector body 60 by sealing flange 60c and sealing of the flanges 60a and 60b to the side of the sampling tube 71 is preferably achieved by a silicone rubber glue. This allows operation of the chamber at other than atmospheric pressure.

The size of the window aperture 74 and the spacing between the light tube 62 and the window together with the focal distance of the concave curved reflector are each optimized to maximise light intensity within the sampling chamber without unduly increasing spurious or stray incident light reflected off the internal walls of the sampling chamber.

The curvature of the reflecting element is developed to follow the "U" shape of the flash tube such that the light output from the whole length of the tube is focused through the flash window into the centre of the sampling chamber.

Accordingly, the use of the reflector of the present invention directly results in a reduction of energy consumption of the lamp by a factor of 2 and without any loss of sensitivity in the detector.

A commensurate extension in lamp life is achieved.

CLAIMS

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Poliution detecting apparatus comprising

a) means forming a sampling chamber;

b) inlet and outlet ports spaced from one another for flowing through said sampling chamber a gas to be sampled;

c) a window in said sampling chamber between said ports;

d) a light source having an elongate component outside said sampling chamber and adjacent said window for admitting into said sampling chamber a first portion of light emitted from said source;

e) reflector means; and

f) means supporting said reflector means adjacent said source for reflecting into said sampling chamber a further portion of light emitted from said source;

g) said reflector means including an elongate component adjacent the corresponding component of said source and being configured to reflect into said sampling chamber substantially all light emitted by said source than said first portion.

2. Apparatus according to claim 1 wherein the supporting means for said reflector means includes a mounting base and peripheral flanges for mounting said reflector means in sealed relation on said sampling chamber.

3. An optical pollution detector comprising, in combination;

a sampling chamber having an axis along which critical light scattering measurements are made;

an inlet and outlet port in said sampling chamber for flowing air to be sampled through said sampling chamber along said axis;

means for illuminating air samples flowing along and adjacent to said axis with high intensity light;

said means comprising a window in said sampling chamber between said ports for admitting high intensity light;

discharge means located outside said sampling chamber and adjacent said window for producing high intensity light; and reflector means to refelect the high intensity light from said discharge means through said window and for focusing it onto said axis and into the immediately adjacent region of the sampling chamber;

wherein said reflector means is developed to follow substantially the configuration of the discharge means such that the light output from substantially the whole length of the discharge means is focused into the centre of the sampling chamber.

4. An optical pollution detector comprising, in combination:

a sampling chamber having an axis along which critical light scattering measurements are made;

an inlet and outlet port in said sampling chamber for flowing air to be sampled through said sampling chamber along said axis;

means for illuminating air samples flowing along and adjacent to said axis with high intensity light;

said means comprising a window in said sampling chamber between said ports for admitting high intensity light;

discharge means located outside said sampling chamber and adjacent said window for producing high intensity light; and

reflector means to reflect the high intensity light from said discharge means through said window and for focusing it onto said axis and into the immediately adjacent region of the sampling chamber in which:

the discharge means comprises a U-shaped tube having straight parallel legs and a semitoroidal link joining said straight parallel legs to each other;

said reflector means comprises two parallel trough shaped regions for focusing light emitted from the respective straight parallel legs of the discharge means onto said axis and the region immediately adjacent thereto.

5. The optical pollution detector of claim 4 in which said reflector means comprises further a longitudinally curved trough region for focusing light emitted from the semitoroidal link onto said axis and the region immediately adjacent thereto.

6. The optical pollution detector of claim 5 wherein the light is transmitted through an open window in the sampling chamber to enable circulation of the tube atmosphere within the reflector body when in operation.

7. Pollution detecting apparatus substantially as herein described with reference to the accompanying drawings.

8. ~~An optical pollution detector substantially as herein described with reference to the accompanying drawings.~~

DATED this 5th July 1988.

MARTIN TERRENCE COLE

EDWD. WATERS & SONS,
Patent Attorneys
50 Queen Street
MELBOURNE. VIC. 3000
AUSTRALIA.

LJD:PNF:jl(4.22)

DRAWINGS

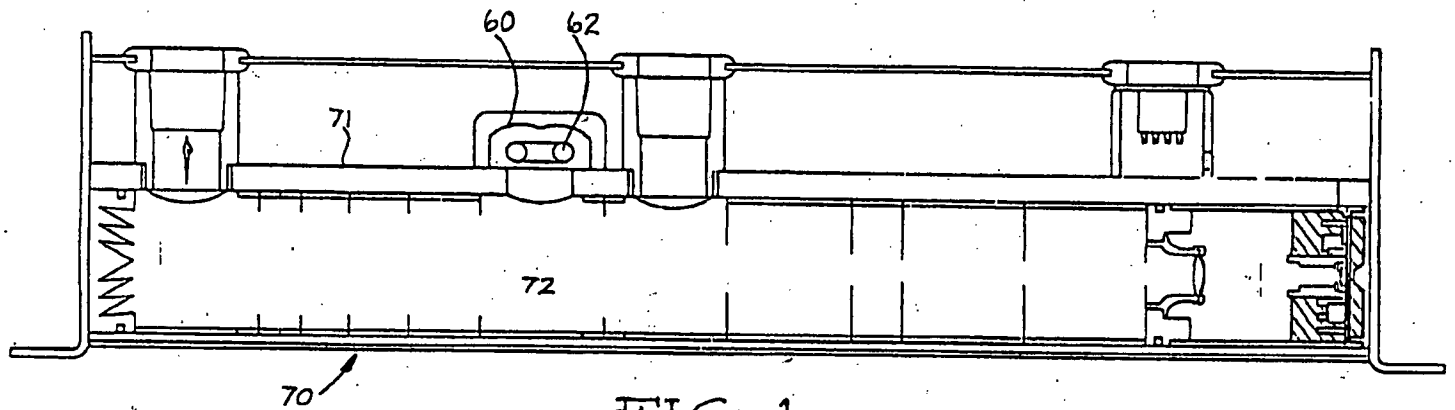


FIG. 1.

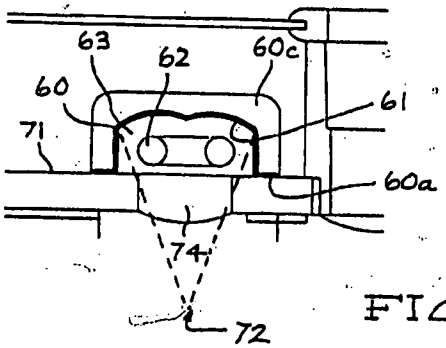
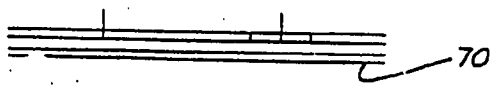


FIG. 2.



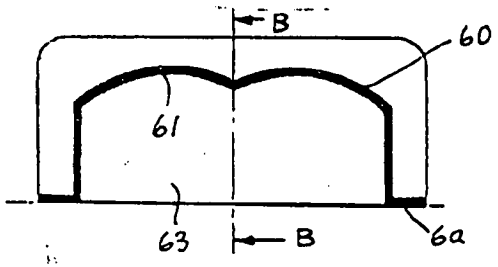


FIG. 3.

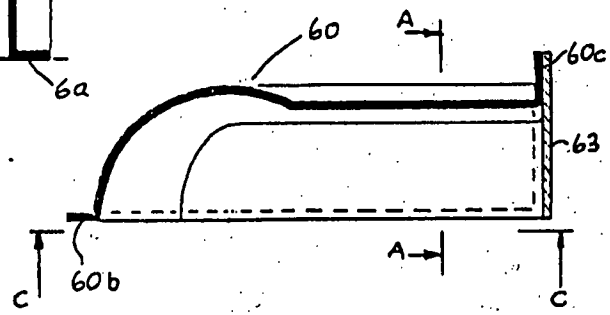


FIG. 4

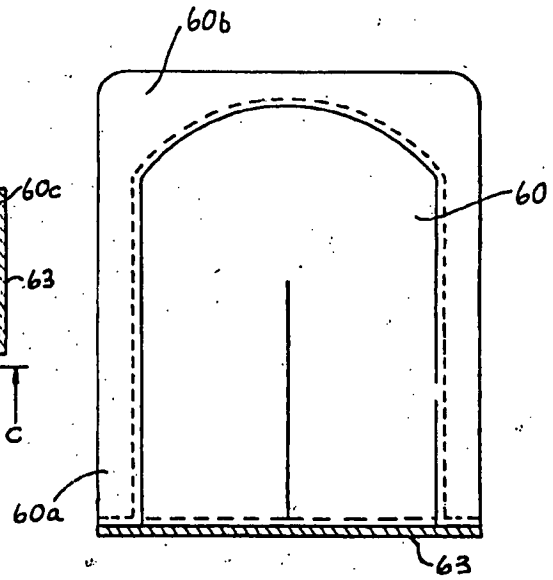


FIG. 5.

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